



Aviation Maintenance Technician

ORAL & PRACTICAL EXAM GUIDE



DALE CRANE

Third Edition

*The comprehensive guide to
prepare you for the FAA **General,
Airframe, and Powerplant**
Oral & Practical Exams*

Aviation Maintenance Technician

ORAL & PRACTICAL

EXAM GUIDE

Third Edition

Based on the original text by

Dale Crane

Edited by

Raymond E. Thompson

College of Aviation, Western Michigan University

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Aviation Maintenance Technician Oral & Practical Exam Guide
Third Edition
by Dale Crane

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Visit the ASA website often at **www.asa2fly.com/TextbookUpdates** to find updates posted there due to FAA regulation revisions that may affect this book.

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Preface

Certification as an aviation mechanic is a major step in your career. You were required to have a certain level of experience to qualify to take your knowledge tests, and having passed all sections, you are now ready for the final step, the oral and practical tests.

The knowledge tests are strictly objective and verify only your knowledge of facts. When taking them, you are interfacing with a computer and there is no personal involvement.

The oral and practical tests are different. In these you work directly with an experienced mechanic on a one-on-one basis. This examiner is able to not only judge your mechanical skills, but to observe the way you think and see the way you solve problems.

It is important that you approach the oral and practical tests with the proper mental attitude. The examiner has one basic thought in mind, that of determining whether or not you have the level of skill needed for an entry-level technician. The examiner will not try to trick you in any way, and he or she wants you to pass almost as much as you do.

If you are asked a question to which you do not know the answer, admit it rather than try to bluff your way through. If you are given a project that you do not understand, discuss it with the examiner. Especially, don't bungle your way through a project you cannot properly execute. The examiner will discuss the project with you, but will show little or no tolerance for your driving ahead with a project you obviously cannot handle.

The oral and practical tests are your last steps toward certification, so study this guide carefully as it is designed to help you prepare for them. We wish you success with them.

Dale Crane
2000

Preface to the Third Edition

The oral and practical exam process has changed radically in recent years. The core practical test items have been removed and the oral and practical questions and projects are randomly generated. This means that examiners must be prepared to test on all projects and students able to perform on all projects.

This also means that the number of practical projects is greatly increased. There are a number of new projects as well; these projects are defined by the Practical Test Standards (PTS) and are captured in this Third Edition. Some test areas were eliminated and new sections added to reflect changes to the PTS.

Raymond E. Thompson, Technical Editor
College of Aviation
Western Michigan University
2016

Certification of Maintenance Airmen

The Federal Aviation Administration has three classifications of maintenance airmen: repairman, authorized inspector, and mechanic. Certification in each category has special requirements and special privileges. This *Oral & Practical Exam Guide* applies to the tests for mechanic certification, but all three classifications are described below.

Repairman

The applicant for a repairman certificate must be employed for a specific job requiring his or her special qualifications by a certificated commercial operator or certificated air carrier.

A repairman applicant must have at least 18 months of practical experience in the procedures, practices, inspection methods, materials, tools, machine tools, and equipment generally used in the maintenance duties of the specific job for which he or she is to be employed and certificated. Or, the applicant must have completed specialized formal training that is acceptable to the administrator and specifically designed to qualify the applicant for the job for which he or she is to be employed.

A repairman may exercise the privileges of the certificate only in connection with the duties for the certificate holder by whom the repairman was certificated and recommended.

There is a special type of repairman certificate issued to the builder of an experimental aircraft which allows the holder to perform condition inspections on the aircraft constructed by him or her.

Authorized Inspector

An applicant for an inspection authorization (IA) must:

- Hold a currently effective mechanic certificate with both an airframe and a powerplant rating that has been in effect for a total of at least 3 years.
- Have been actively engaged, for at least the 2-year period before the date of application, in maintaining civil certificated aircraft.
- Have a fixed base of operation.
- Have available the equipment, facilities, and inspection data necessary to properly inspect airframes, powerplants, propellers, or any related part or appliance.
- Pass a knowledge test on his or her ability to inspect according to safety standards for returning aircraft to service after major repairs and major alterations, and annual and progressive inspections performed under 14 CFR Part 43.

The holder of an inspection authorization may:

- Inspect and approve for return to service an aircraft after a major repair or major alteration if the work has been done in accordance with technical data that has been approved by the administrator.
- Perform an annual inspection, or perform or supervise a progressive inspection.

An inspection authorization expires on March 31 of each year and must be renewed for a 1-year period at that time.

Mechanic

The FAA issues a Mechanic Certificate with an Airframe rating, Powerplant rating, or both ratings to applicants who are properly qualified. Below are descriptions of the experience, knowledge, and practical requirements, and suggested study references for all three ratings.

Requirements for Mechanic Certification

14 CFR Part 65 *Certification: Airmen Other Than Flight Crewmembers* covers the requirements for mechanic certification, described below.

Basic Requirements

- Must be at least 18 years of age.
- Must be able to read, write, speak, and understand the English language, or in the case of an applicant who does not meet this requirement and who is employed outside of the United States by a U.S. air carrier, have his or her certificate endorsed “Valid only outside the United States.”
- Must have passed all of the prescribed tests within a period of 24 months.

Experience Requirements

Must have a graduation certificate or certificate of completion from a certificated aviation maintenance technician school, or documentary evidence, satisfactory to the Administrator, of:

- At least 18 months of practical experience with the procedures, practices, materials, tools, machine tools, and equipment generally used in constructing, maintaining, or altering airframes or powerplants appropriate to the rating sought; or
- At least 30 months of practical experience concurrently performing the duties appropriate to both the airframe and powerplant ratings.

Knowledge Requirements and Knowledge Tests

After meeting the applicable experience requirements, each applicant for a mechanic certificate must pass a knowledge test covering the construction and maintenance of aircraft appropriate to the rating sought, the regulations that pertain to the rating, and the applicable provisions of 14 CFR Part 43 (*Maintenance, Preventive Maintenance, Rebuilding, and Alteration*) and Part 91 (*General Operating and Flight Rules*).

The basic principles covering the installation and maintenance of propellers are included in the powerplant test.

The applicant must pass each section of the knowledge test before applying for the oral and practical tests. There are three knowledge tests, a General test that is required for both ratings, and tests for both the Airframe and Powerplant ratings. An applicant for the Airframe rating must pass the General and the Airframe test, and an applicant for the Powerplant rating must pass the General and Powerplant test. The General test needs to be taken only one time.

All test questions are the objective, multiple-choice type with three choices of answers. The minimum passing grade for each test is 70 percent.

The General test consists of 60 multiple-choice questions selected by computer from more than 600 questions in the *Aviation Mechanic—General* test question bank. You are allowed 1.5 hours to take this test. The Airframe and Powerplant tests each consist of 100 multiple-choice questions taken from the more than 1,000-question *Aviation Mechanic—Airframe* and the more than 1,000-question *Aviation Mechanic—Powerplant* test question banks. You are allowed 2 hours for each of these tests.

If the score on your airman test report is 70 or above, the report is valid for 24 calendar months. You may elect to retake the test in anticipation of a better score, after 30 days from the date your test was taken. The score of the latest test you take will become the official test score. If you fail a knowledge test, you may apply for retesting before 30 days if you present the failed test report and an endorsement from an authorized mechanic certificate holder. This endorsement must certify that additional instruction has been given, and you have been found competent to pass the test (the endorsement is not necessary if you wait 30 days).

Skill Requirements

Each applicant for a mechanic certificate or rating must pass an oral and a practical test on the rating sought. These tests cover the applicant's basic skill in performing practical projects on the subjects covered by the knowledge test for that rating. These testing procedures are covered in detail beginning on Page x.

An applicant for a Powerplant rating must show his or her ability to make satisfactory minor repairs to, and minor alterations of propellers.

The examiner will download an oral and practical examination that is generated at random for each applicant. Each candidate should be familiar with all the knowledge and skill requirements contained within the appropriate test standards.

ASA Study Materials

The ASA Fast-Track Guides for General, Airframe, and Powerplant Mechanic have been specially prepared to help you get ready to take your FAA knowledge tests, and since the same material is covered in your oral and practical tests, review all of the questions and answers in the knowledge test portion of these Guides.

The questions in this Exam Guide are typical of those you will likely be asked. The practical projects that accompany each section are typical of those the examiner will be apt to use to check your level of skill. The *actual* questions and projects will depend upon the examiner. Your examiner is a knowledgeable mechanic who can evaluate your capabilities, so don't try to "snow" him or her with words when you don't know the answer, and don't attempt any project that you are not competent to handle. It is far better to admit your lack of knowledge or skill than to blunder into a project, which shows that you lack the judgment to properly evaluate your capabilities.

Included in each section of this Guide are references to other ASA textbooks, FAA handbooks and Advisory Circulars, and other study materials that apply specifically to that section or subject covered, such as manufacturers' service guides and information.

Reference codes used in this guide are as follows:

AMT-G	<i>Aviation Maintenance Technician—General (ASA)</i>
AMT-STRUC	<i>Aviation Maintenance Technician—Airframe, Volume 1 (ASA)</i>
AMT-SYS	<i>Aviation Maintenance Technician—Airframe, Volume 2 (ASA)</i>
AMT-P	<i>Aviation Maintenance Technician—Powerplant (ASA)</i>
ASA-MHB	<i>Aviation Mechanic Handbook (ASA)</i>
FAA-S-8081-26, -27, -28	Aviation Mechanic for General, Airframe, and Powerplant Practical Test Standards (available as ASA-8081-AMT)
AC 39-7	Airworthiness Directives (FAA Advisory Circular)
AC 65-2	Airframe and Powerplant Mechanic’s Certification Guide (FAA Advisory Circular)
AC 43-4A	Corrosion Control for Aircraft (FAA Advisory Circular)
AC 43.13-1B	Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair (FAA Advisory Circular)
14 CFR	Title 14 of the Code of Federal Regulations. (Reprints of the applicable parts are in ASA’s FAR/AMT.)

The Oral and Practical Tests

Prerequisites

All applicants must have met the prescribed experience requirements as stated in 14 CFR §65.77. In addition, all applicants must provide:

1. Proof of having unexpired passing credit for the Aviation Mechanic General (AMG) knowledge test by presenting an Airman Computer Test Report (except when properly authorized under the provisions of 14 CFR §65.80 to take the practical tests before the airman knowledge tests).
2. Identification with a photograph and signature.

Test Standards

The examiner will download an oral and practical examination that is generated at random for each applicant that reflects all the knowledge and skill “Areas of Operation.”

“Areas of Operation” are subject areas in which aviation mechanic applicants must have knowledge or demonstrate skill.

“Tasks” are the items that should be performed according to standards acceptable to the examiner.

“Reference” identifies the publication(s) that describe the task. *Information contained in manufacturer and/or FAA approved data always takes precedence over textbook referenced data.*

The objective of each Task lists the elements that must be satisfactorily performed to demonstrate competency in the Task.

The objective includes:

1. Specifically what the applicant will be able to do.
2. Conditions under which the Task is to be performed.
3. Acceptable standards of performance.

These terms apply to each Task:

- “Inspect” means to examine by sight and touch.
- “Check” means to verify proper operation.
- “Troubleshoot” means to analyze and identify malfunctions.
- “Service” means to perform functions that ensure continued operation.
- “Repair” means to correct a defective condition.
- “Overhaul” means to disassemble, inspect, repair as necessary, and check.

The applicant should be well prepared in *all* knowledge and skill areas included in the standards.

Satisfactory performance to meet the requirements for certification is based on the applicant's ability to:

1. Show basic knowledge.
2. Demonstrate basic mechanic skills.
3. Perform the Tasks within the standards of the reference materials.

The practical test is passed if, in the judgment of the examiner, the applicant demonstrates the prescribed level of proficiency on the assigned Tasks in each Area of Operation. Each practical examination item must be performed, at a minimum, to the performance level in the practical test standards. For mechanic testing, there are three practical performance levels:

- Level 1: You must know basic facts and principles and be able to locate information and reference materials. You do not have to interpret information or demonstrate a physical skill.
- Level 2: Know and understand principles, theories, operations, and concepts. You must be able to find, interpret, and apply maintenance data and information. You must be able to select and utilize the appropriate tools and equipment. While you need to demonstrate adequate performance skills, you do not need to demonstrate skill at a high or return-to-service quality level.
- Level 3: Know and understand principles, theories, operations, and concepts. You must be able to find, interpret, and apply maintenance data and information, select and utilize the appropriate tools and equipment to the overall operation and maintenance of an aircraft. You must be able to demonstrate the ability to work independently and make accurate judgments of airworthiness. You must demonstrate skills at a high level which includes the ability to perform return-to-service levels of work.

If, in the judgment of the examiner, the applicant does not meet the standards of any Task performed, the associated Area of Operation is failed and therefore, the practical test is failed.

Typical areas of unsatisfactory performance and grounds for disqualification are:

1. Any action or lack of action by the applicant that requires corrective intervention by the examiner for reasons of safety.
2. Failure to follow recommended maintenance practices and/or reference material while performing projects.
3. Exceeding tolerances stated in the reference material.
4. Failure to recognize improper procedures.
5. The inability to perform to a return-to-service standard, where applicable.
6. Inadequate knowledge in any of the subject areas.

When an applicant fails a test the examiner will record the applicant's unsatisfactory performance and Tasks not completed in terms of Areas of Operation appropriate to the practical test conducted.

The General Oral and Practical Tests

There are twelve “Areas of Operation” that are tested on the General Oral and Practical Exams.

Following this list are the suggested study areas, typical oral questions with succinct answers and typical practical projects for each area of operation.

- I. Basic Electricity
 - A: Measure capacitance
 - B: Calculate inductance
 - C: Calculate and measure electrical power
 - D: Measure voltage, current, resistance, and continuity
 - E: Determine the relationship of voltage, current, and resistance in electrical circuits
 - F: Read and interpret aircraft electrical circuit diagrams, including solid state devices and logic functions
 - G: Inspect and service lead-acid batteries
 - H: Inspect and service nickel-cadmium batteries

- II. Aircraft Drawings
 - A: Use drawings, symbols, and system schematics
 - B: Draw sketches of repairs and alterations
 - C: Use blueprint information
 - D: Use graphs and charts

- III. Weight and Balance
 - A: Weigh aircraft
 - B: Perform weight and balance check and record data

- IV. Fluid Lines and Fittings
 - A: Fabricate and install rigid fluid lines and fittings
 - B: Fabricate and install flexible fluid lines and fittings

- V. Materials and Processes
 - A: Identify and select appropriate nondestructive testing methods
 - B: Perform dye penetrant, eddy current, ultrasonic, or magnetic particle inspections
 - C: Perform basic heat-treating processes
 - D: Identify and select aircraft solid shank rivets, bolts, and associated hardware
 - E: Identify and select aircraft materials
 - F: Inspect welds
 - G: Perform precision measurements

- VI. Ground Operation and Servicing
 - A: Start, ground operate, and move aircraft and identify typical ground operation hazards
 - B: Service aircraft
 - C: Secure aircraft
 - D: Identify and select fuels

Continued

- VII. Cleaning and Corrosion Control
 - A: Identify and select cleaning materials
 - B: Inspect and identify aircraft corrosion
 - C: Remove and treat aircraft corrosion and perform aircraft cleaning
 - D: Clean and protect metallic materials
 - E: Clean and protect plastics and composite materials

- VIII. Mathematics
 - A: Extract roots and raise numbers to a given power
 - B: Determine areas and volumes of various geometrical shapes
 - C: Solve ratio, proportion, and percentage problems
 - D: Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers

- IX. Maintenance Forms and Records
 - A: Write descriptions of work performed, including aircraft discrepancies and corrective actions using typical aircraft maintenance records
 - B: Complete required maintenance forms, records, and inspection reports
 - C: FAA forms and information

- X. Basic Physics
 - A: Use and understand the principles of simple machines and sound dynamics
 - B: Use and understand the principles of fluid dynamics
 - C: Use and understand the principles of heat dynamics
 - D: Use and understand the principles of basic aerodynamics, aircraft structures, and theory of flight

- XI. Maintenance Publications
 - A: Demonstrate ability to read, comprehend, and apply information contained in FAA and manufacturer's aircraft maintenance specifications and data sheets
 - B: Demonstrate ability to read, comprehend, and apply information contained in aircraft maintenance manuals, and related publications
 - C: Demonstrate ability to read, comprehend, and apply information contained in Federal Aviation Regulations
 - D: Demonstrate ability to read, comprehend, and apply information contained in Airworthiness Directives (AD)s
 - E: Demonstrate ability to read, comprehend, and apply information contained in advisory material

- XII. Aviation Mechanic Privileges and Limitations
 - A: Exercise mechanic privileges within the limitations prescribed by 14 CFR Part 65

I. Area of Operation: Basic Electricity

A. Task: Measure Capacitance

Reference: AMT-G, Chapter 4

Typical Oral Questions

1. What constitutes a capacitor?

Two conductors separated by an insulator.

2. What is the purpose of a capacitor?

It stores electrical energy in electrostatic fields.

3. Does a capacitor in an AC circuit cause the current to lead or lag the voltage?

It causes the current to lead the voltage.

4. What is the basic unit of capacitance?

The farad.

5. Why should electrolytic capacitors not be used in an AC circuit?

They are polarized. An electrolytic capacitor will pass current of one polarity, but will block current of the opposite polarity.

Typical Practical Projects

1. Using a capacitor tester and capacitor furnished by the examiner, determine the capacity of a capacitor and whether or not it is serviceable.
2. Find the capacitive reactance in an AC circuit for the values of capacitance and frequency specified by the examiner.

B. Task: Calculate Inductance

Reference: AMT-G, Chapter 4

Typical Oral Questions

1. What is meant by inductance?

The ability to store electrical energy in electromagnetic fields.

2. What is the basic unit of inductance?

The henry.

3. What is an example of an inductor used in a magneto?

The coil.

4. Does an inductor in an AC circuit cause the current to lead or lag the voltage?

It causes the current to lag behind the voltage.

5. How can you find the polarity of an electromagnet?

Hold the electromagnet in your left hand with your fingers encircling the coil in the direction electrons flow (from negative to positive). Your thumb will point to the north pole of the electromagnet.

6. What is meant by impedance?

The total opposition to the flow of alternating current. It is the vector sum of resistance, capacitive reactance, and inductive reactance.

7. In what units is impedance measured?

In ohms.

Typical Practical Projects

1. Given the inductive reactance caused by a coil and the frequency of the AC in a circuit, compute the inductance.
2. Find the inductive reactance in an AC circuit for the values of inductance and frequency specified by the examiner.

C. Task: Calculate and Measure Electrical Power

Reference: AMT-G, Chapter 4

Typical Oral Questions

1. What are five sources of electrical energy?

Magnetism, chemical energy, light, heat, and pressure.

2. What is the basic unit of power in a DC circuit?

The watt.

3. What is meant by a kilowatt?

1,000 watts.

4. What is meant by a megawatt?

1,000,000 watts.

5. What is the formula for power in a DC circuit?

Power = Voltage times current ($P = E \cdot I$)

6. What is the relationship between mechanical and electrical power?

1 horsepower = 746 watts

7. What is meant by true power in an AC circuit?

The product of the circuit voltage and the current that is in phase with this voltage.

8. In what units is true power expressed?

In watts.

9. What is meant by apparent power in an AC circuit?

The product of the circuit voltage and the circuit current.

10. In what units is apparent power expressed?

In volt-amps.

11. What is meant by reactive power in an AC circuit?

*The power consumed in the inductive and capacitive reactances in an AC circuit.
Reactive power is also called wattless power.*

12. In what units is reactive power expressed?

In volt-amps reactive (VAR), or kilovolt-amps reactive (KVAR).

13. What is meant by power factor in an AC circuit?

The ratio of true power to apparent power. It is also the ratio of circuit resistance to circuit impedance.

Typical Practical Projects

1. Compute the number of watts of power consumed by a 1/5 horsepower, 24-volt DC motor that is 75% efficient.
2. Compute the amps of current drawn by a 1,000-watt landing light in a 24-volt DC electrical system.
3. Find the total number of watts dissipated by two lamps wired in parallel in a 12-volt circuit, if one lamp requires 3 amps and the other 1.5 amp.

D. Task: Measure Voltage, Current, Resistance, and Continuity

Reference: AMT-G, Chapter 4

Typical Oral Questions

- 1. Which law of electricity is the most important for an aircraft mechanic to know?**
Ohm's law.
- 2. What are the elements of Ohm's law?**
Voltage E , current I , and resistance R (volts, amps, and ohms).
- 3. What is voltage?**
Electrical pressure.
- 4. What is the basic unit of voltage?**
The volt.
- 5. What instrument is used to measure voltage?**
A voltmeter.
- 6. To measure voltage, is a voltmeter placed in series or in parallel with the source of voltage?**
In parallel.
- 7. What is electrical current?**
The flow of electrons in a circuit.
- 8. What is the basic unit of current flow?**
The ampere (amp).
- 9. What part of an amp is a milliamp?**
One thousandth (0.001) of an amp.
- 10. What instrument is used to measure current flow?**
An ammeter.
- 11. What two things happen when current flows through a conductor?**
Heat is generated and a magnetic field surrounds the conductor.
- 12. To measure current through a component, is an ammeter placed in parallel or in series with the component?**
In series.

13. What is meant by resistance in an electrical circuit?

The opposition to the flow of electrons.

14. What is the basic unit of electrical resistance?

The ohm.

15. What is a megohm?

One million (1,000,000) ohms.

16. What four things affect the resistance of an electrical conductor?

The material, the cross-sectional area, the length, and the temperature.

17. What instrument is used to measure electrical resistance?

An ohmmeter.

18. How can you tell the resistance of a composition resistor?

By a series of colored bands around one end of the resistor.

19. What is meant by continuity in an electrical circuit?

The circuit is continuous (or complete) when electrons can flow from one terminal of the power source to the other.

20. What instrument is used to measure continuity in an electrical circuit?

An ohmmeter.

21. When measuring resistance of a component with an ohmmeter, should the circuit be energized?

No, there should be no power on the circuit.

Typical Practical Projects

1. Measure the voltage drop across a resistor in an energized DC circuit specified by the examiner.
2. Measure the DC current through a component specified by the examiner.
3. Measure the resistance of a component specified by the examiner and determine whether or not it is within the limits specified in an appropriate service manual.
4. Demonstrate to the examiner the correct way to check an electrical circuit for continuity.
5. Install wires into an electrical connector assigned by the examiner and test for continuity.

Aviation Maintenance Technician **ORAL & PRACTICAL EXAM GUIDE**

Based on the original text by Dale Crane

Edited by Raymond E. Thompson

The oral and practical exams are the last steps for certification of an Aviation Maintenance Technician (AMT). The *AMT Oral & Practical Exam Guide* by industry expert Dale Crane will prepare the reader for the General, Airframe, and Powerplant exams. This book includes information on the certification process, typical projects and required skill levels, and practical knowledge requirements in a question-and-answer format, with references defined for further study.

When taking an FAA Knowledge Exam, you merely verify your knowledge of facts—you interface with a computer and there is no personal involvement. The AMT oral and practical tests are different: you work one-on-one with an experienced mechanic evaluator who is able to not only judge your mechanical skills, but observe how you think and see the way you solve problems. The examiner determines whether or not you possess the knowledge and skill level needed as an entry-level technician, as defined by the FAA Practical Test Standards (PTS). The *AMT Oral & Practical Exam Guide* will help you prepare for this significant step towards your new career as an AMT.

More Dale Crane books available from ASA:

Aviation Mechanic Handbook

A handy toolbox-size reference for AMTs and IAs. Nonabrasive spiral-bound book provides conversions, formulas, densities, solid state electronics, and more.

Dictionary of Aeronautical Terms

Aviation is an industry of acronyms and technical language, making this dictionary essential for everyone. Understand all the terms and phrases from all facets of aviation.

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